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THE AGRICULTURAL STUDENT



J.S. MORRILL

N.S. TOWNSHEND

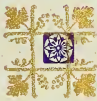
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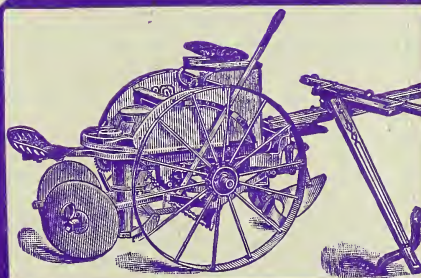
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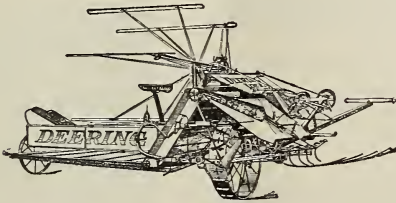
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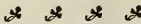
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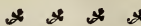


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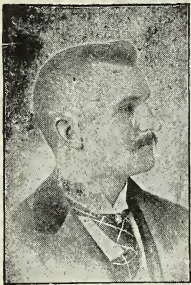
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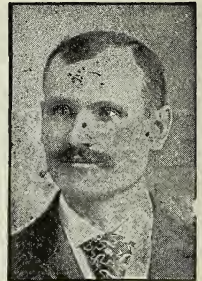
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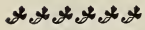
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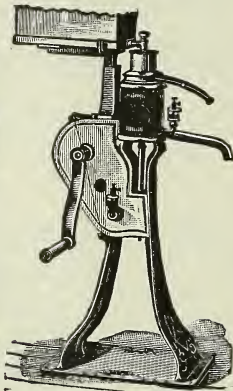
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EDITORIAL CHAT.

In the demise of Professor Kellicott the University has lost one of her strongest men, the scientific world one of its brightest lights, and more than this, many loose a true friend, and there is removed from our midst one of Nature's noblemen. Others have spoken of his attainments because they were able to do so. We wish to remember him as we knew him, a loving, inspiring friend, a faithful and conscientious worker, and above it all, a man. He was a lover of nature in all her forms, but especially did he love the beauties of animal life. He loved to study animals, as such, and not as dead specimens. In this he showed the tender and kindly nature that ever characterized him. He loved to study the living birds and to hear their song. They seemed to fill him with their happiness. And so, at Easter time, he joined his spirit with their song, and accompanied by the Eolian harp of the Spring, together they sang of something like—**ETERNITY.**

Upon our first page of this issue appears a cut of the new building which is to be occupied by the Departments of Physiology and Zoology. "Biological Hall" has been suggested as a name for this building, but many object to it on account of its inappropriateness, all the

biology taught in the University not being taught in this building. It occurs to us that the man who has recently gone from among us could not have a more suitable monument and memorial than this building for which he worked and planned so long. We respectfully suggest that the Board of Trustees consider naming the building for him, and call it Kellicott Hall.

With this issue the Agricultural Student completes its fourth volume. We feel that the year has been one of progress and profit for us as amateur journalists, and we trust that our product has shown much improvement. As will be seen upon examination, we have endeavored to bring up the general tone of the magazine, and many of the articles published, while not being what are commonly called popular subjects, have been of a scientific nature, and have been greatly appreciated by those for whom they were intended. It will be our aim in the future to present matter of a scientific nature as well as new things in practical agriculture, horticulture and the natural sciences. We take this opportunity of thanking our contributors of the past year, and suggest that they make use of this magazine as a medium through which new investigations may be made known in the future.

As the organ of the College of Agriculture and Domestic Science of the Ohio State University, we deem it proper to sum up the results of the work of the college year, as compared with the entire University, and as regards increase in the number of students. During the year just drawing to a close, 142 persons have received instruction in this College, as compared with 97 last year, a gain of 45 for the College. When we note that the attendance for the entire University has been 1069, as compared with 1019 last year (making a gain of fifty), we see that a large percentage of the gain is in that rising department, the College of Agriculture and Domestic Science. To the total attendance for this year, however, will be added the attendance at the summer school. We feel safe in saying that the attendance at the University will be over 1100 for the year. Statistics of attendance for the last few years may be interesting:

	College of Agriculture.	Entire University.
1890-91.....	31.....	493
1891-92.....	40.....	668
1892-93.....	47.....	794
1893-94.....	71.....	800
1894-95.....	90.....	810
1895-96.....	83.....	969
1896-97.....	97.....	1019
1897-98.....	142.....	1069

News Items.

Homer C. Price, a former well-known student and later a graduate of the Agricultural Department of the Ohio State University, delivered a well-written address this afternoon before the farmers of the vicinity.—The Denisonian.

Mr. H. H. Loomis has accepted a position at Mentor, O. Mr. Loomis was in the Senior Class and would have graduated this year had he remained in college.

Mr. C. K. McClelland, of the class of '98, has donned the blue uniform and is in with the soldiers of Camp Bushnell. He will receive his degree, however, at the coming commencement.

Prof. S. H. Gage, of Cornell, in writing to Prof. Lazenby, says: "It was a great shock to hear of the death of Prof. Kellicott. Pneumonia does not spare the vigorous or those whom the world can ill do without. I have known Prof. Kellicott so long and our relations have been so cordial that it seems like a personal loss. * * * Prof. William A. Rogers died very recently and now Prof. Kellicott, two of the staunchest friends the American Microscopical Society ever had."

Mr. W. H. Baker, who graduated in the course in agriculture in 1892, and who is now the manager of a large farm near Farmersville, Mo., is making preparation to establish a large commercial apple orchard. He has just made a contract with a nurseryman for ten thousand root grafts, to be ready in one year. Mr. Baker will select the scions for these grafts himself, paying especial attention to vigor, fruitfulness and quality. As there are numerous young orchards in full bearing close at hand, there will be an excellent opportunity to make a good choice. The scions will be placed on short piece-roots and planted deep so that as far as possible they may throw out roots of their own, and in this way it is expected to secure not only productive, but thrifty and long-lived trees.

Despite the warm weather of March our fruit trees are blooming later than usual this year. They have been held back by the low average temperature of April. Peach, plum and cherry trees are usually in full bloom at least one week earlier than they are the present season. This late blooming is desirable, for it lessens the risk of injury by spring frost.



DAVID SIMONS KELLICOTT, PH. D., F. R. M. S.

BORN, HASTINGS CENTER, N. Y., JANUARY 28, 1842.

DIED, COLUMBUS, O., APRIL 13, 1898.

Funeral Services.

On the morning of Saturday, April 16, the funeral services were held at King Avenue Methodist Episcopal church.

The services were begun with a short prayer at the home by the pastor, Rev. T. G. Dickinson. The remains were then taken to the church. Beside the hearse walked the pall-bearers, Captain Cope, representing the trustees of the University; Professors Kellerman, Derby and Bleile, representing the faculty, and Mr. W. F. Janeway and Mr. A. C. Houghton, representing the church of which Professor Kellicott was a member. Behind the hearse and the carriages came the trustees of the University, the faculty and students.

At the church the services were opened with appropriate music by the O. S. U. Quartette. The Scripture lesson was read by Dr. W. H. Scott and prayer was offered by Rev. J. W. Dillon, Professor Kellicott's first pastor.

After a responsive service by the pastor and the Quartette, and a hymn by the Quartette, Rev. Dickinson made an address upon the life and work of the deceased. His address appears elsewhere in this number of the Student.

President J. W. Bashford, of the Ohio Wesleyan University, then spoke at some length of the life of Professor Kellicott, his strong personality and noble nature, and paid a high tribute to him as a man.

The services were closed by prayer by Rev. Dickinson.

The private interment was made in Green Lawn Cemetery, Columbus.

HIS WORK.

The scientific attainments of Professor Kellicott have been gratefully recognized by an appreciative public. At the time of his death he was president of the American Microscopical Society and general secretary of the American Association for the Advancement of Sci-

ence, and treasurer of the Ohio Academy of Science. At one time he was president of the Buffalo Academy of Science; also of the Ohio State Academy of Science. He was among the first of this country to be elected member of the Royal Microscopical Society.

A man of liberal tastes and broad culture, his life-work was in the natural sciences. Earlier he devoted considerable time to botany, especially the lower aquatic vegetation. Pond-life was particularly attractive to him. Some animal parasites of fishes were the first new species he described. Besides the rotifera, in later years he made particular studies of special groups of insects. The dragon flies received much attention; he had practically completed a monograph of the Ohio species. The clear-wing moths also received assiduous attention. Several new species of rotifers and of dragon flies were described by him. During last summer much of his time was devoted to the work entitled "Dissection of the Ophidian." Students of anatomy will be grateful for this work, which fills a wide gap in vertebrate dissection. The last paper that he prepared was on the "Distribution of the Rotifers," and was read before the Biological Club of the Ohio State University on the day when his fatal illness began.

EXPRESSION OF THE FACULTY.

"The faculty of Ohio State University deeply lament the death of their colleague, Professor David Simons Kellicott.

"The University has met the immeasurable loss of a faithful, earnest and inspiring teacher; wise and firm in counsel, modest, considerate and righteous in his judgments. By his attainments he has won distinguished recog-

nition in the field of science, reflecting high honor upon the University and bringing good to his fellow-men. His untimely death, in the prime of his strength, has deprived the world of the still higher good betokened by what he already had accomplished. To his colleagues he was endeared by his gentle nature, his kindly sympathy, his high devotion to principle and his Christian courtesy and influence. While the world has lost one of its noble men, his colleagues feel that they have lost a true friend and an inspiring example of right living and well-doing.

"The faculty desires to express to those who were most dear to him their deepest sympathy, and to assure them that his high services and quiet uplifting influence will always be held in tender remembrance.

"GEORGE W. KNIGHT,
"BENJAMIN F. THOMAS,
"JOSEPH V. DENNY,
"A. M. BLEILE,
"W. A. KELLERMAN,
"Committee."

ACTION OF THE STUDENTS.

At a mass meeting of students held April 18, the following tribute to Professor Kellicott was adopted:

The students of the State University desire to express their sense of their great loss in the following memorial:

It is our sad misfortune to suffer the loss of one of our beloved friends and instructors, Professor David Simons Kellicott.

We have always recognized in him those qualities which endeared him to the hearts of all those with whom he was associated.

We offer our most sincere sympathy to his bereaved family, though in the midst of our sorrow we believe that were it not for the best the Father who

rules over all would not have permitted this affliction to befall those who mourn.

ACTION OF THE BIOLOGICAL CLUB.

At a called meeting of the Biological Club April 16, this memorial to Professor Kellicott was adopted and placed upon the minutes of the club:

"Professor Kellicott was one of the founders of the Biological Club, and has been till now its most active worker and faithful attendant. In his death, which has just occurred, we sustain an irreparable loss. He was not only foremost in carrying on the work which the club was designed to promote, but his example and his suggestions to students beginning the study of Natural History have incited many to carry on pleasurable and profitable work in observation and original research.

"The reports from time to time of his own investigations were carefully prepared and presented with clearness and animation. Though his sickness had begun at the time of our last meeting, yet his paper was the main subject of the session and was read in his absence.

"In excursions planned and carried out by the club, he was invariably the most interested participant. At a recent meeting he proposed a resumption of these collecting trips and anticipated much pleasure in the results of the arrangements about completed.

"We recall with pleasure the large amount of work he has done, especially in the study of the rotifers and the dragon flies, some new species of which groups he has already described. Students will be grateful for the guide he has recently published on the 'Dissection of the Ophidian.'

"But most of all we cherish the memory of so faithful and conscientious worker, and are grateful for the noble and uplifting influence that comes from a life so well spent."

ACTION OF THE WHEATON CLUB.

The Wheaton Club, at a called meeting April 16, 1898, placed on its minutes the following tribute to the memory of its most earnest and devoted member, Professor D. S. Kellicott:

"In the death of Professor Kellicott the Wheaton Club has sustained an irreparable loss. He was one of the charter members of the club and even as a young man his first scientific interest was the study of ornithology. Since its organization he has been its most active supporter and his tireless efforts have been the principal factor in the success of the club and a source of inspiration to his fellow-members. He had a vast fund of information, collected during years of observation, which was always at the disposal of the club. He was a keen observer and fascinating lecturer on subjects connected with the work of this organization. His love for birds and bird life was strong and no one could come in contact with him without acquiring some of the same spirit which actuated his observations.

"His association with the younger members of the club was always of the most informal and friendly nature. Another member's observations seemed to give him as much pleasure as his own. Much of healthy scientific interest which he stimulated among young men with whom he has been associated, was due to the thoroughly unselfish manner in which he labored with those less experienced than himself.

"As a laborer in scientific work the club has lost in Professor Kellicott a keen and kindly observer. As a friend it mourns one whose sympathy and interest were unfailing and whose unselfishness will long be remembered as the chief characteristic of a rich and true nature."

Oration

Delivered at the Funeral of Professor David Simons Kellicott in King Avenue Methodist Episcopal Church April 16, 1898, by Thomas Gilford Dickinson, the Pastor.

David Simons Kellicott was born at Hasting's Center, Oswego county, New York, January 28th, 1842. He was a frail and delicate boy and spent much of his time in the open air, where we can infer he early acquired a love for nature and received an inspiration that made him a devoted student of the hidden beauties of the natural world.

He received such education as the common schools of the village could give him; it may not have been very much when viewed from the heights of higher learning, but it gave the young man a thirst that caused him to drink deeper from the fountains of knowledge. (He is a great teacher and that school fulfills the ideal purpose when they awaken in a pupil a thirst and hunger for knowledge.)

He entered Genesee College, as it was called then, since known as Syracuse University, and received from it the degree of Bachelor of Science.

His road to learning was not particularly smooth, for which we have no regrets, as the more rugged paths often produce the grander types of manhood. He was limited as to means and worked in order to secure an education. He would teach a year and then attend school a year and so on amid difficulties and embarrassments, mingled with deep satisfaction born of independence and self-reliance, he pursued his studies.

One year prior to his graduation he secured a school at Scioto Furnace, a small village in the iron regions of Southern Ohio. Here he united with the Methodist Episcopal Church, under the pastorate of the Rev. John W.

Dillon, now pastor of Mt. Vernon Avenue Methodist Episcopal Church in this city.

He selected teaching as his profession (and he could not have chosen a nobler one). He taught one year in Mexico Academy, New York; one year in Keystone Normal School, Pennsylvania; seventeen years in the State Normal School, of Buffalo, N. Y., from which place he came to the Ohio State University in 1888.

This, my friends, is a very brief sketch of a noble life that has been too short for those who loved him.

Concerning his work as an educator and inspirer of young men and his attainments in his departments of science, I am not competent to speak; others who are thoroughly qualified will do that at a later date.

I wish now to speak of Professor Kellicott as I have known him and worked with him in church relationship. It seems to me that only a pastor can fully appreciate a noble, unselfish, sacrificing layman. This was his church and he loved it. Nothing but sickness or some circumstance he could not control kept him from his accustomed seat. He was a reverent worshipper, an attentive listener and always appreciated any words spoken that were helpful to him.

In the Sunday school he was ever an energetic worker. We gave him a class of students. He loved them and they loved him. He made the same careful preparation to go before that class that he would make to appear before his classes at the University. Our Sunday school work the land over only has a few such workers. In Bible study he gathered light from all sources. He knew how to make each ray illuminate the sacred page. He was modern in his views and ancient in his reverence and love for the word of God, which lost none of its grandeur to him, because stripped of a few non-essentials that it gathered in its progress down the ages. This year we relieved him of this work. He seemed to need the rest.

As an officer in the church we valued him. His counsel in official meetings was just what we wanted and we did well when acting upon his suggestions. He served as an active member and not an honorary one on every committee I ever put him on. The church to him was a family. He loved all the gatherings, attended every picnic in summer or social or festival in winter that was held under the auspices of the church or its societies.

He was larger than his local church—he took great interest in the affairs of his church at large, her missionary and her law-making body—he seemed to be a part of the whole and felt that they were his interests.

He was broader than his creed, and viewed all creeds from the standpoint of the cross and loved every one who loved God.

Professor Kellicott was devoted to his profession; for this he appeared to live, and yet his reading was of wider range. I have wondered when he found the time to feast in other fields, but he did, and he was ever awake to new lines of thought and discovery of truth in departments other than his own. But this is characteristic of a man of true culture. He did not simply cultivate the faculty of observation as a man of science is tempted to do to the neglect and atrophy of other faculties; his reading was wide, he knew much which made him delightful in conversation.

Life to him was a school, he was ever a diligent pupil. This seems to be really a part of the divine play in life. God means it so; it is by this method he prepares his children for Himself. This school of life, for instance, educates the eye that it may behold the glories of God; for this, is there any department in the school of life as rich as that of natural science? Our friend and brother saw the beauties of the bud, the flower and the leaf, the bird, the fish and the

tiny insect of the air; with such an eye he saw the beauties of God. He truly looked through nature up to nature's God, whom he saw as God of the granite and the rose, soul of the sparrow and the bee, and for countless ages the mighty tide of being had flowed from Him.

In this school his eye was not trained to the neglect of heart and soul. He loved nature and his sensibilities, affections and whole esthetic nature were richly fed and trained. He loved music and the spring of the year was nature's divine symphony to his ear. It is only here in life's school that we can be properly prepared for the richer enjoyment of a life with God.

As our friend and brother has passed from one school to another in life, so he has passed upward and onward to a higher school, where he can still pursue researches after truth under less difficulty than of necessity attended him here, where at best he could only see through a glass darkly, but

“How glorious now with vision purified,
At the Essential Truth, entirely free
From error, he, investigating still,
From world to world at pleasure roves
on wing
Of golden ray upborne; or at the feet
Of Heaven's most ancient sages sitting, hears
New wonders of the wondrous works of
God.”

He last attended church on Palm Sunday. Who did think that his triumphal entry into the New Jerusalem was so soon? On Monday he went to the University, on that evening he was taken ill, and from the first was a very sick man. On Easter I was shocked by a messenger, who said, “Professor Kellicott is very low.” I hastened to him to find it true. While I knelt by his bedside he clasped my hand with a firm and manly grip. I put my ear close to him

to catch some sacred words and this is what he said to me: "Pastor, I feel it is all well with me; since a very young man I have tried to live for such an hour as this." When I left him I said: "God bless you," and I did not expect to see him again. With a heavy heart I came to church to conduct, if I could, the Easter service. Soon a messenger came and said he was better; it relieved me greatly; but still all the people and myself were depressed. But Easter to him was Easter after all; the birds brought him Easter songs, and flowers were sent him by those who loved him; he took one in his hand and handled it, caressed it so tenderly and looked upon it as only a lover of flowers can do, and while it baptized him with sweet fragrance, he responded in love.

In the afternoon he said, "Pastor, did you have a pleasant festival?" and my response pleased him. And so his last Easter on earth was one of peace, soon to be prolonged to one perpetual Easter in the skies.

On Monday the skies brightened, but Tuesday brought tenebrous clouds again, and Wednesday, to the satisfaction of those who loved him and could do no more, brought its sweet release from suffering and ushered in eternal peace.

We say our friend is dead. We have no other term to use. But to those who live a Christian life, death is an experience in life, it is a triumphal entry, a Palm Sunday to the soul, with Easter dawn just ahead. So let us not think of night, or gloom, or dark, for he was a just man and ever turned his face towards the greater dawn. His death is sunrise; "Mors Janua Vitae."

A loving husband, a kind father, a noble citizen, a sincere friend, a true Christian, has retired earlier than we have, and as was said of Professor Henry Drummond, "He has put aside the well-worn tools without a sigh, expecting elsewhere better work to do."

So he has joined the choir invisible of these immortal dead who live again in lives made better by their presence.

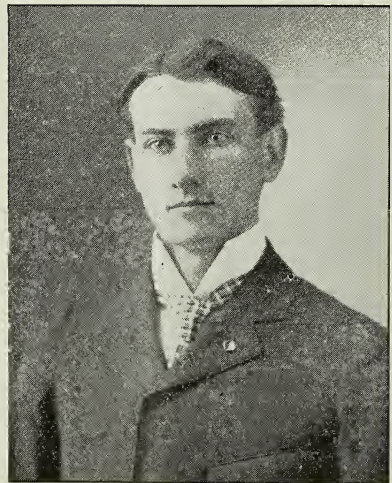
His chair in the University another will fill; his seat in church will be occupied by others, but after all the vacancy made by the resignation of this strong personality will remain.

I have been made better by knowing him. God make us worthy of his memory and in other worlds may it be ours to clasp the manly hand of David Simons Kellicott.

Our Senior Class.

Graduates in the Courses in Agriculture and Horticulture and Forestry.

Chalmer Kirk McClelland was born in Andover, Ashtabula county, O., September 12, 1877. In his early boyhood days he attended district school and later the graded schools in the village of Andover. In the fall of 1890 he entered the High school, from which he graduated in 1898. He has always lived

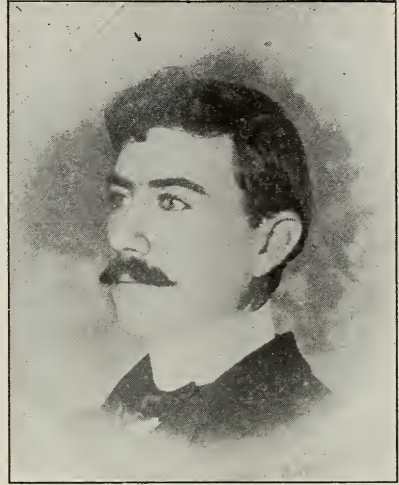


on the farm and worked there morning and evenings while attending school and during vacations. During his senior year at High school he was president of the High School Literary Society.

In September, 1894, he entered the Ohio State University as a Freshman in the course in agriculture, which course he expects to finish this year. He worked on the O. S. U. farm during two of his summer vacations, and at various times during the school year. He drilled in the battalion (Co. A, Capt. Henrietta), his first year in college, and the next he gave up military aspirations to become a member of Bope's Big Brass Band. He and F. S. Johnston, also of Ashtabula county, are working a joint thesis on "Conformation of the American Trotting Horse." On June 14, 1895, he enlisted in Co. A, Fourteenth Infantry O. N. G., and has now "gone to the front" (or rather to camp) with his regiment. He is a member of Alpha Zeta Fraternity, and is president of Townshend Literary Society. He has always been a brilliant student and a leader among his classmates.

John Carr Britton was born in Davis county, Ia., September 16, 1873. While yet quite young his parents removed eastward and settled in Guernsey county, O., where they resided until 1881, when he removed with his parents to Cambridge, O. Here he received his early training in the schools of that village. At an early age he was left to shift for himself on account of the sudden disappearance of his father in 1883. In 1887 he returned to the country with his mother and brother and sister, where he worked on a farm in summer and attended school in winter. In 1890 he went to Morrow county and attended school in the village of Iberia. He attended the Iberia Classical Institute in 1891, and during the winter of 1892 attended High school in Mt. Gilead, O. In September, 1893, he entered the University. In the spring of 1896 he left college to work for the Experiment Sta-

tion at Wooster. He was president of Townshend Literary Society during the fall term of the present year. He graduates in June with the degree of B. Sc.



Mr. Britton is a thorough student and is an unusually good experimenter. His work is always well done, his ideas original and all is done with the greatest accuracy and care.

William C. Mills was born at Pyremont, O., January 2, 1860. He attended the public schools at that place, and after completing the course presented by those schools he taught for four years. He came to the Ohio State University in the fall of 1881, when Dr. Edward Orton was president of the University. He was here under President W. Q. Scott and President W. H. Scott, one year each. Thus he can say that he has attended the University under every president it has ever had.

On completing his junior year in the University he entered the Cincinnati College of Pharmacy and at the same time attended the Ohio Medical College. On finishing his course at Cincinnati he engaged in practical pharmacy at that place. He finally sold out his business in Cincinnati and went to Columbus, where he entered again into the practice of pharmacy. After remaining here for

some time he again sold out and went west to Kansas and Colorado, where he took up the same business which he had followed while in the East. But the western climate did not agree with him and he returned east to Ohio, to enter the



Buxton & Mills Construction Company, of which he was the junior partner. This company did heavy construction and bridge work, and operated in Ohio, Indiana, Illinois and Michigan. To some it may appear that Mr. Mills was not settled as to the course he was to follow, but suffice to say that each one of business moves just mentioned was eminently successful, and that he continually had in mind the thought that when the proper time arrived he was to return to O. S. U. and finish his college course.

What Mr. Mills has shown to be possible for one who has a good head and is able to use it, is surely an inspiration to all young men. He came to O. S. U. with no money whatever, worked his way through school, and had enough ahead to take him to Cincinnati and enter him in college there.

He has always been deeply interested in the study of archaeology, and probably has no superior in this part of the country either as an investigator, student or collector. His collections, historical

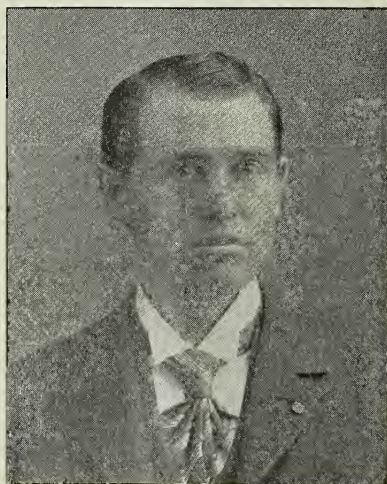
and archaeological, are among the finest to be seen, and he has kindly loaned them to the museum at the University. He is an honorary member of the Western Reserve Historical Society, a member of the old Tuscarawas Archaeological Society and a member of the Ohio Archaeological and Historical Society. He is a Mason and belongs to several other organizations and orders. During the present year he became a member of the Alpha Zeta Fraternity. He was president of Townshend Literary Society during the winter term of this year.

Mr. Mills may be said to be a man of genius, if there are any such. Not only is he an excellent and deep student, but he is an artist in water colors, an expert penman and a splendid business man.

He graduates this spring in the course in Horticulture and Forestry.

The University may be proud to have such an alumnus.

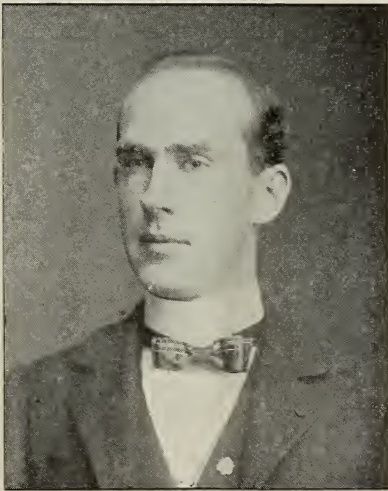
Geo. A. Flickinger was born September 18, 1874, at York, Union county, O. He attended a country school in winter and worked on the farm in the summer.



At a Farmers' Institute in the winter of '92-'93 he was asked if he would not like to attend the State University as a student of agriculture. Upon replying in the affirmative a free scholarship ap-

pointment was secured in January, '93. In March he passed a teachers' examination for entrance at the University and continued his studies during the spring. He entered O. S. U. September, '93, expecting to complete only the short course in agriculture. In September, '94, he entered the long course and has continued in school ever since, in the main supporting himself, working at home one summer and upon the University grounds three summers. He is an active member of the Townsend Agricultural Society and the Y. M. C. A., besides taking some active part in church work. He is a hard student and has always stood well in his classes. He is a careful worker and a sound reasoner.

Clarence W. Waid was born in Fulton county, O., May 2, 1874. He attended the district village schools quite regularly until he was 17 years of age.



when he entered the High school at Morenci, Mich. He attended this school regularly and graduated in 1894. The following fall he came to the Ohio State University as the choice of several institutions of higher learning.

Mr. Waid has always been an earnest student and a hard worker in many college organizations. He has been vice

president of the Y. M. C. A., recording secretary, treasurer, critic and vice president of Townsend Literary Society. He has been an active worker in North Congregational church ever since coming to Columbus. He is a member of the Alpha Zeta Fraternity.

Mr. Waid graduates this spring in the course in Horticulture and Forestry. He has always shown great interest in the work concerned in this course of instruction, and his efforts as a student have always been eminently fruitful.

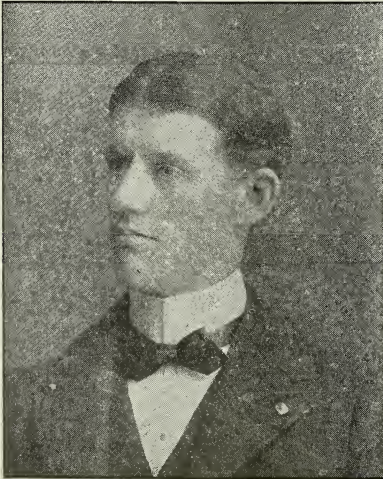
Wm. H. Gilmore was born in Licking county, O., and when one year old



moved with his parents to Auglaize county, O. His summer months were spent on his father's farm and he attended district school in the winter months. When twelve years old he, with his parents, moved to Fairfield county, O. After finishing the district school he began business with his father, but soon concluded that a higher education was necessary to cope with the opposition in this busy world. He then entered the public schools at Millersport, Fairfield county, O. After spending five months there he came to the conclusion to enter O. S. U. The spring term of 1894 was spent here, still with the idea of teach-

ing. He went to Pleasantville, O., Normal School to spend the summer. But while there decided for himself that the O. S. U. was the best place to fit him for his life work. In the fall of 1894 Mr. Gilmore came back to the O. S. U. as a preparatory student, and fitted himself for the pursuance of his studies in agriculture. Then thinking that he had found his field he kept steadily at his work both summer and winter, and will graduate in the course in agriculture this spring. Mr. Gilmore is an industrious and diligent student, and his summers have been spent at the University either in the summer school, in experimenting, or working on the farm.

Albert Warren Nettleton was born at Medina, O., January 10, 1876. His boyhood days were spent on the farm and he attended the district school until he entered Medina High school, from which he graduated in 1894. In the fall of the same year he entered the Ohio State University in the short course in agriculture. After finding what advantages a first-class college

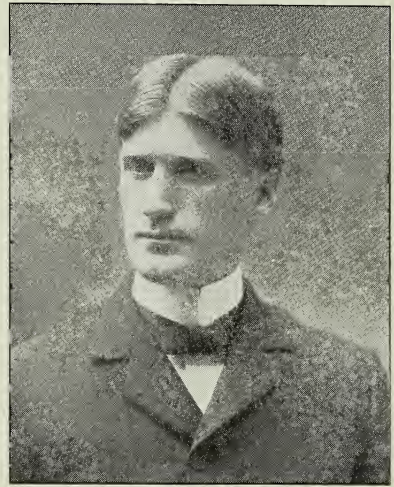


course had in store for him, he entered the long course in agriculture, which he finishes this spring. He has always been an excellent student, not only in the studies particularly concerned in

his course, but in general college work as well. By his enthusiastic support he has been of great good to general college affairs.

He is an active member, and at present secretary, of Townshend Literary Society. He is a member of Alpha Zeta Fraternity.

Carl James Miller was born near Franklin, O., on December 22, 1874. His youth was spent in attending the



district school and doing odd jobs about the farm. After learning all there was to be had in the common schools he started into Twin Valley College, from which he graduated in 1892 in the literary course. The following year he entered upon post-graduate work in the same college, but left before the year was complete, to engage in business. In the fall of 1893 he came to the Ohio State University and finished his course here this spring. He was out of college, however, during the year '95-'96 on account of sickness, which took him home before the fall term was half over.

Mr. Miller graduates this spring in the Course in Agriculture. He has been a general student and a general college man ever since coming to O. S. U., and his general interest in college affairs has made him universally popular. He is a

member of Kappa Sigma and Alpha Zeta fraternities and Townshend Literary Society. He has ably filled the position of tackle on the 'Varsity foot ball team for three years. When he leaves O. S. U. a host of friends will bid him God-speed.

Methods of Cultivation.

As Controlling Yield of Corn and Moisture Content.

(Thesis by W. H. Gilmore.)

A very important question that is agitating the minds of the farmers of Ohio today is the question of deep and shallow cultivation of corn. Knowing this and being anxious to help solve this question this investigation was undertaken.

Six plats were selected with soil as nearly uniform as possible. The plats contain about 1-16 of an acre of rather sandy soil.

The ground was plowed about six inches deep May 19. It was then prepared for planting by being rolled once and harrowed twice. On May 29 the plats were marked 3 feet 8 inches both ways. Leaming corn was then planted by hand and covered about two inches deep with the hoe. Up to this time the plats were all treated alike, but from this on all are treated differently. Plat No. 1 was mulched three inches deep with wheat straw and then left until ripe. Plat No. 2 received no treatment whatever. No. 3 no treatment but shaving the surface with hoe to keep down the weeds. No. 4 was cultivated four times $1\frac{1}{2}$ inches deep with a Planet Junior cultivator. No. 5 cultivated four times $1\frac{1}{2}$ inches deep with a Planet Junior cultivator. No. 5 cultivated fuor times 4 inches deep with same implement. No. 6 cultivated in the same way $2\frac{1}{2}$ inches deep. Corn all harvested September 15

and husked one month later with following results:

Plot No.	Yield per acre, bu.	Yield of stover, lbs.
1.	76.4	5315.0
2.	51.4	3571.1
3.	75.9	4152.5
4.	83.5	5315.2
5.	80.9	5365.0
6.	79.0	5896.5

Samples of soil were taken of each plat alike one foot deep on alternate days beginning June 1 and continuing until September 10. These samples of soil were then weighed and dried in an oven at 110° F, and again weighed, and amount of water determined, with the following results:

Plot No.	Per cent. of moisture.				
	June.	July.	Aug.	Sept.	Av. % of mois.
1.		20.30	16.24	13.97	16.74
2.	16.34	13.94	9.65	7.73	12.75
3.	15.38	15.00	9.97	8.54	12.76
4.	16.41	15.33	10.51	9.07	13.04
5.	16.00	16.16	11.32	10.75	13.56
6.	16.22	16.35	12.49	10.41	13.66

Two-foot samples were also taken once a week and treated as above, with the following results:

Plot No.	Per cent. of moisture.				
	June	July.	Aug.	Sept.	Av. % of mois.
1.		18.07	14.92	13.32	14.17
2.	15.46	12.39	12.96	10.90	12.43
3.	15.14	15.48	13.00	11.44	13.08
4.	16.05	15.64	14.27	14.32	14.88
5.	15.61	16.19	14.55	11.99	14.00
6.	16.31	16.51	14.55	11.84	14.21

The result shows that the shallow cultivated plat is first on the list in yield of grain, third in stover and contained the most moisture for the season.

The Effect of Concussion in Butter Making. (Outline of Thesis by G. A. Flickinger.)

The object of this thesis is to ascertain the changes in the individual fat globules during the process of churning, as observed by the microscope, and to

record these changes by means of photography. The photographic part of the work has failed in part, but some very interesting facts have been recorded:

1. That the larger fat globules are the first ones to be united.

2. That under given conditions the process of uniting takes place quite uniformly.

3. That the process of uniting is at first very slow and continues so till just a short time before the cream "breaks," when it becomes quite rapid and the accumulated particles of fat attain a size sufficient to overcome surface friction and rise to the top immediately, thus accounting for the sudden "breaking" of cream when we say that butter comes.

Root Tubercles in Water Culture.

(Outline of Thesis by John C. Britton.)

The object of the experiments in this thesis was to determine whether or not it is possible to produce tubercles on the roots of Legumes by inoculation in a culture solution. Since the discovery by Prof. Helriegel of the true connection between these tubercles and the nitrogen of the air, many experiments have been made, but largely in sterilized sand.

We know that if the tubercles could be given in a clear solution their growth and development could be watched.

After several attempts we succeeded in getting the tubercles to form on the roots and to furnish the necessary nitrogen. The common pea plants were used and grown in a system of jars especially designed by Prof. Weber to get a continual changing of the solution so that it would not become stagnant. Three sets of apparatus were used. In set No. 1 was placed a complete nutrient solution and after getting it the proper strength the plants grew normally and

produced flowers and seed. In set No. 2 was placed a solution containing all the elements necessary to plant growth except nitrogen, and in this solution the plants acted very strangely. The roots grew out rapidly and soon filled the jars in which they grew. The tops grew tall and slender and in one case produced a blossom which caused the speedy death of the plant.

In apparatus No. 3 we succeeded in getting results that were the object of the experiments. This set of jars contained the same solution as No. 2, except that after the plants were placed in the jars the solution was inoculated with an infusion made from a soil in which peas had been grown. The plants in this set of jars acted for a few days exactly like those in apparatus No. 2, and for a time it seemed that they would die for the want of nitrogen. But after about 15 days the bacteria came to the rescue and immediately the plants began to recuperate. About this time I noticed that tubercles had formed on the roots. had a healthy appearance, grew normally and produced flowers and seeds in due season.

Several points of interest were noted in connection with these experiments, an account of which space will not permit, and more are still to follow in the work that is still being done by us along this line.

A List of Honey Plants

And Some Observations on Certain Species.

(Thesis by C. W. Waid.)

The list consists of a systematically arranged list of all the plants given by several of the latest and best writers on the subject.

They are arranged in three divisions:

I. Those known to be good honey plants.

II. Those known to produce honey.

III. Those uncertain.

Each division is arranged according to the arrangement in Gray's Manual, No. VI, both the scientific and common name is given, and at the end an alphabetically arranged index of the common names is given. Although this is scientifically arranged, yet it can be used as well by any one who does not understand the scientific names.

Each plant is given in its family and each family is given in botanical sequence. There is a short description of each plant given and when it is known, something of its honey producing qualities have been stated.

Some observations are made on the working of bees on the fruit trees, somewhat of a comparison between the different kinds, as to time of bees working and numbers of bees working on the same. This part will not be very practicable, as it only extends over this year.

Soil Moisture as Influenced by Fall and Spring Flowing.

(Outline of Thesis by A. W. Nettleton and C. J. Miller.)

The object of this thesis is to determine whether it is better to plow the land for corn in the fall or in the spring, in so far as it influences the moisture retaining power of the soil.

The field where the experiments were carried on, belongs to the O. S. U. farm, part of it second bottom and part first bottom bordering on the Olentangy river.

It was plowed in such a way that both the fall and spring plowed included first and second bottom land. The land received as nearly as possible the same preparation for seeding, and after seeding it received the same cultivation at as nearly the same time as possible, in order that the crop on either plot should not have any advantage from that source to make a better growth and thus utilize more of the soil moisture.

The field was so divided that there were four plots—fall plowed first bottom, fall plowed second bottom, spring plowed first bottom and spring plowed second bottom.

Samples for determining the soil moisture were taken in the following way: An inch iron pipe was driven into the ground at different depths—one, two and three feet—each sample was put in an air-tight tin box, weighed, put in an oven, dried and reweighed, thus the per cent. of water contained in the soil was determined.

Samples to the depth of one and two feet were taken daily and three feet twice a week from each plot. Duplicate samples were taken and their average used in figuring out the results.

Samples were taken from the time the corn was planted until it was cut. The rainfall during the growing season was 8.92 inches.

The total average was as follows:

Surface foot fall plowed, first bottom, 20.3 per cent.; surface foot spring plowed, first bottom, 18.8 per cent.; surface foot fall plowing, second bottom, 12.9 per cent.; surface foot spring plowing, second bottom, 13. per cent.

Surface two feet fall plowed, first bottom, 18.8 per cent.; surface two feet spring plowed, first bottom, 17.8 per cent.; surface two feet fall plowed, second bottom, 13.7 per cent.; surface two feet spring plowed, second bottom, 14.4 per cent.

Surface three feet fall plowed, first bottom, 18.9 per cent.; surface three feet spring plowed, first bottom, 17.7 per cent.; surface three feet fall plowed, second bottom, 14.5 per cent.; surface three feet spring plowed, second bottom, 14.9 per cent.

Thus it will be seen that on the first bottom land the fall plowed retained the more moisture at all depths, while on the second bottom land the spring plowed retained the more in all three

depths. The difference on the first bottom is well marked, while on the second bottom it is very slight.

It is also interesting to compare the retaining power of moisture of the first and second bottom soil.

A Comparative Study

Of the Woods of Certain Hard and Soft Timber Trees.

(Outline of Thesis by W. C. Mills.)

The woods selected were Basswood, Bur Oak, Ohio Buckeye and Hickory.

For comparative study, each of the trees were studied in the following order:

1. Wood structure.
 - (a) Exterior form.
Development in the standing trees. Describing the root system, branches, twigs and relative amounts of material furnished by each.
 - (b) Interior structural appearance.
Describing structural features of the wood. Distribution and size of medullary rays, vessels, fibrovascular, bundles, etc., as exhibited to the naked eye; also under the microscope on tangential, radial and transverse sections. Appearance of the annual rings, their size, regularity, differentiation into spring and summer wood, and all distinguishing features due to the arrangement and proportion.
 - (c) Minute Anatomy.
Form, dimensions and structure of different kinds of cells.
2. Physical properties.
 - (a) Exterior appearance.
Such properties as color, gloss, texture and smell.
 - (b) Material condition.
Such properties and changes as are determined by measurements as density of net water contents and changes caused by shrinkage and swelling.
3. Mechanical properties.
Strength, cleaveability and hardness.

A List of Grain Diseases.

Prepared Under Supervision of Prof. J. H. Schaffner.

A LIST OF THE DISEASES OF WHEAT.

(*Triticum Vulgare*.)

COMPILED BY FRED. W. TAYLOR.

I. SCHIZOMYCETES.

1. *Micrococcus* Prill. Red coloration of wheat. Bacteriaceae. "Ann. d. Sci. Nat." Ser. VI, 1878, p. 248.

II. ASCOMYCETES.

2. *Claviceps purpurea* Fr. Ergot. Pyrenomyces. Hypocreaceae. Tulasne, "Ann. d. Sci. Nat." Ser. III, 20. Smith, "Diseases of field and garden crops," 1884, p. 233.

3. *Pleospora sarcocystis* B. & C. (*Sphaeria trichostoma* Fr.) (*Sphaeria sarcocystis* B. & O.) (*Pyrenophora trichostoma* Sacc.) (*Pyrenophora sarcocystis* Rav.) Pyrenomyces, Pleosporeae. "Sacc. Syll." 3793. "Grev." IV, p. 152.

4. *Dilophia graminis* Sacc. Pyrenomyces, Pleosporeae. Tubeuf & Smith, "Diseases of Plants," p. 222.

5. *Gibbellina cerealis* Pass. Pyrenomyces, Pleosporeae. "Reone Mycologinque," Oct. '86, T. & S., "Diseases of Plants," p. 220.

6. *Leptosphaeria herpotrichoides* de Not. (Doubtful disease.) Pyrenomyces, Pleosporeae. "Zeitschrift f. Pflanzenkrankheiten."

7. *Ophiobolus graminis* Sacc. Disease of the foot of wheat. Pyrenomyces, Pleosporeae. "Jour. d'agric. pratique," 1892. T. & S. "Diseases of Plants," p. 222.

8. *Erysiphe graminis*, D. C. Powdery mildew of wheat. Perisporeae, Erysipheae. T. & S., "Diseases of Plants," p. 175.

III. FUNGI IMPERFECTI.

9. *Septoria graminum* Desm. Leaf spot. Sphaeropsidae, Sphaerioideae. Cava, "Zeitsch. f. Pflanzenkrankheiten," Vol. III. Ek., "Om Några synkdomar ä odlade Växter."

10. *Dilophospora graminis*. Desm. Sphaeropsidae, Sphaeriaceae. T & S., "Diseases of Plants," p. 479.

11. *Phoma hennebergii*, Kuhn. Brown Spot. Sphaeropsidae, Sphaeriaceae. "Hedwigia," 1877. "Zeit. für Pflanzen," III, 1893.

12. *Cladosporium herbarum*, Pers. Black disease on the grains (doubtful disease.) Hyphomycetes, Dematiaceae. "Berichte d. deutsch. botan. Gesell.," 1892. "Landwirth, Jahrbuch," 1894.

13. *Mystrosporium abrodens*, Neumann. Hyphomycetes, Dematiaceae. "Societe de Biol," à Toulouse, 1892. T & S., "Diseases of Plants," p. 518.

14. *Fusisporium culmorum*. Scab. (*Fusarium culmorum*.) Hyphomycetes, Tuberculariaceae. "Disease of Field and Garden Crops," p. 208. Bull. 44, Ohio Exp. Sta., Sept. '92.

IV. USTILAGINEAE.

15. *Tilletia tritici* (Bjerk.) Winter. Stinking smut. (*Uredo foetida*, Bauer.) (*Tilletia caries*, Tul.) Tilletiaceae. Bull. LVI Guelph Agr'l. Coll., 1890. Bull. Ohio Exp. Sta., II ser., Vol. IV, No. 4.

16. *Tilletia laevis*, Kuhn. Stinking smut. (*Ustilago foetens*, B. & C.) (*Tilletia foetens*, Trel.), Tilletiaceae. "Jour. of Mycol.," Vol. V, p. 165. Bull. Ohio Exp. Sta., II ser., Vol. III, No. 6.

17. *Tilletia controversa*, Kuhn. Smut. Tilletiaceae. T. & S., "Diseases of Plants," p. 309.

18. *Ustilago tritici* (Pers.) Jensen. Loose smut of wheat. Ustilaginaceae. (*Uredo segetum*, Pers.) (*Ustilago segetum*, Ditm.) (*Ustilago carbo*, Auct.) "Cult. & Country Gent.," Vol. 55, p. 855. "An. Rep. Kan. Exp. Sta.," 1890.

19. *Ustilago hypodytes*, Schl. Smut. (*Caeoma hypodytes*.) Ustilaginaceae. "Flor. Berol.," Vol. II, p. 129.

V. UREDINEAE.

20. *Puccinia graminis*, Pers. Black rust. (*Uredo linearis*, Pers.) (*Caeoma lineare*, Schl.) Puccineae. "Microsp.

Jour.," March '90, Vol. XI. "Neb. Farmer," March '90, Vol. XIV.

21. *Puccinia glumarum*, Er. & Hen. Yellow rust. (*Puccinia rubigo-vera*, D. C.) Puccineae. "Jour. of Mycol.," '93, p. 288. "Bot. Gaz.," Jan., '98.

22. *Puccinia dispersa*, Er. & Hen. Brown rust. (*Puccinia rubigo-vera*, D. C.) Puccineae. "Amer. Garden," March '90. "Bot. Gaz.," Jan., '98.

VI. BASIDIOMYCETES.

23. *Typhula graminum*, Karst. Hymenomycetes, Clavariaceae. "Landtbr. Akad. Hand. v. Tidakt," 1879. T. & S., "Diseases of Plants," p. 431.

DISEASES OF RYE. (*Secale Cereale*, L.)

By F. S. ATEN.

I. ASCOMYCETES.

1. *Claviceps purpurea* (Fries.). Pyrenomycetes, Hypocreaceae. Tulasne, annal. d. sci. Natur. 3 ser. 20: Kuhn. Mittheilungen d. landwirth. Institut. Halle (1863).

2. *Dilophia graminis* Sacc. Pyrenomycetes, Sphaeriaceae.

3. *Leptosphaeria herpatrichoides* de Not. Pyrenomycetes, Sphaeriaceae. Stalks attacked and break down or break over at node or roots like when attacked by Hessian fly.

II. FUNGI IMPERFECTI.

4. *Dilophospora graminis* Desm. Sphaeropsidae, Sphaeriaceae.

5. *Fusarium heterosporum* Nees. Hyphomycetes, Tuberculariaceae. Species of *Fusarium* have been found and do injury to cereal and grass crops. Some cases to a serious extent.

6. *Helminthosporium gramineum* Rabenh. "Black smut disease" on rye. Hyphomycetes, Mucedineae. Causing withering of rye and barley leaves.

III. USTILAGINEAE.

7. *Tilletia secalis* (Cord.). Tilletiaceae.

8. *Urocystis occulata* (Wallr.) Rab. Tilletiaceae.

9. (?) *Urocystis agropyri* (Preuss.). Tilletiaceae.

10. *Ustilago secalis* Rabenh. Ustilaginaceae. Occurs rarely and destroys only the grain of rye.

IV. UREDINEAE.

11. *Puccinia graminis* Pers. Specialized form *Secalis*. Black rust of rye, Eriksson Bot. Gaz. 15: 28 (1898).

12. *Puccinia dispersa* Er. & Hen. Specialized form *Secalis* (*P. rubigo-vera* D C.). Brown rust of rye.

13. *Puccinia glumarum* (Schm.) & Hen. Specialized form *Secalis*. (*P. rubigo-vera* D C.). Yellow rust of rye.

DISEASES OF INDIAN CORN. (*Zea Mays*, L.)

By D. W. GALEHOUSE.

I. SCHIZOMYCETES.

1. *Bacillus cloacae* Burr.

(*B. secales* —)

(*B. zeae* —)

Bacterial disease of corn. Ill. Exp. Sta. Bull. No. 6, 1889.

2. *Bacillus*. Bacterial disease of corn. N. Y. Exp. Sta. Bull. 130, 1897.

II. PHYCOMYCETES.

3. *Pythium de Baryanum* Hesse. Peroumosporeae. Cornell Univ. Agrl. Exp. Sta. Bull. 94, 1895.

III. FUNGI IMPERFECTI.

4. *Helminthosporium turcicum* C & Ell. (*Helminthosporium inconspicuum* Pers.) Hyphomycetes, Dematieae. Tubeuf and Smith, p. 512.

IV. USTILAGINEAE.

5. *Ustilago Mays* Zea (D. C.) Magn. Corn Smut. (*Ustilago Maydis* D. C.)

Kansas Exp. Sta. Bull. No. 62, 1896. Ohio Exp. Sta. Bull. No. 78, 1897. Botanical Gazette XXIII, 44, 1897.

6. *Ustilago Reiliana* Kuhn. Head smut of sorghum on corn. Kansas Exp. Sta. Bull. No. 62, 1898.

V. URIDINEAE.

7. *Puccinia sorghi* Schwein. (*Puccinia Maydis* Ber.) Tubeuf and Smith, p. 353. North Am. Fungi (1834), p. 295.

8. *Uredo glumarum* Rob. Rust on corn. Tubeuf and Smith, p. 420.

DISEASES OF BARLEY. (*Hordeum Vulgare*, L.)

By N. NEILL.

I. ASCOMYCETES.

1. *Erysiphe graminis* D. C. mould or mildew of barley. Perisporiaceae Erysipheae.

II. FUNGI IMPERFECTI.

2. *Helminthosporium gramineum* (Rab.). "Black smut-disease" of barley. Hyphomycetes, Mucedineae. Eriksson, Bot. Centrabl. 29: (1887.)

3. *Hormodendron hordii* Br. Hyphomycetes, Dematieae. Bruhne, Zopf's Beitr. z. Physiol. u. Morph. neid. Organismen 4: (1894.)

4. *Phoma lopostomoides* Sacc Sphaeropsidae, Sphaerioidae. Cavara et Eriksson, Zeitsch. f. Pflanzenkrankheiten, 3: 23.

III. USTILAGINEAE.

5. *Ustilago hordei* (Pers.) Kell & Sw. Covered barley smut. Ustilaginaceae.

6. *Ustilago nuda* (Jens.) Naked barley smut. Ustilaginaceae.

7. *Ustilago medians*. Zeitschr. f. Pflanzenkrankh. 4: 321, 1894.

IV. UREDINEAE.

8. *Puccinia graminis* Pers. Specialized form—*Secalis*. Black rust of barley.

9. *Puccinia glumarum* (Schw.) Er. & Hen. Specialized form—*Hordei*. (*Puccinia rubigo-vera* D. C.) Yellow rust of barley.

10. *Puccinia simplex* (Kcke.) Er. & Hen. (*Puccinia rubigo-vera* D. C.) Dwarf rust of barley. Botanical Gazette 25: 20, 1898.

DISEASES OF OATS. (*Avena Sativa*, L.)

By J. C. PERRY

I. ASCOMYCETES.

1. *Erysiphe graminis* D. C. Powdery mildew of grass, oats, etc. Perisporiaceae, Erysipheae.

II. FUNGI IMPERFECTI.

2. *Cladosporium herbarum* (Pers.) Hyphomycetes, Dematiaceae.

3. *Fusicladium destruens* Peck. Hyphomycetes, Dematiaceae.

4. *Helminthosporium teres* Sacc. Hyphomycetes, Dematiaceae.

5. *Scolecotrichum graminis* Fck. Hyphomycetes, Dematiaceae.

6. *Fusarium avenaceum*. Hyphomycetes, Tuberculariaceae.

7. *Septoria graminum* Desm. Sphaeropsidae, Sphaerioidae.

III. USTILAGINEAE.

8. *Ustilago avenae* (Pers.) Jen. Oat smut.

9. *Ustilago avenae* (Pers.) Jen. Var. *levis* Kell. & Sw. Ann. Rep. Kansas Exp. Sta. 2: 259.

10. *Ustilago Kolleri* Wille.

IV. UREDINEAE.

11. *Puccinia graminis* Pers. Specialized form *Avenae*. Black rust of oats.

12. *Puccinia coronifera* Kleb. (*Puccinia coronata* Cor.) Specialized form *Avenae*. Crown rust of oats.

Directions for Taking Soil for Analysis at the O. S. U.

BY PROF. H. A. WEBER.

1. Never send a sample from a field which, without fertilizers, is capable of yielding a full crop. On a soil of this nature commercial fertilizers will not pay.

2. Never send a sample from a field, which is not in a good, high state of cultivation, i. e., which is not well drained, and where soil when cultivated is not deep and pulverulent. Commercial fertilizers cannot counteract bad physical conditions of the soil.

3. Never send a sample from a meadow or clover sod, but always from fields that are under cultivation.

4. If a field is in a high state of cultivation and still fails to produce more than half a crop there is good reason to believe that its soil is deficient in one or more of the essential ingredients of plant food. From such a field an average sample of the soil should be sent

for testing. In order to collect an average sample of the soil, proceed as follows:

Begin at one end of the field and cross it back and forth at intervals of eight or ten paces until the other end is reached. While thus crossing dig a square hole with a spade, every eight or ten paces, down to the sub-soil. Cut off a slice of the soil about two inches thick from the surface down to the top of the sub-soil and throw it into wagon bed. Avoid all local contaminations, as the droppings of cattle, piles of decaying vegetable matter, etc. Remove any trash from the surface by scraping before digging the hole. Also avoid any low places in the field, especially if they are filled with black soil or leaf mould. Mix the soil thus collected thoroughly with a spade and then place not less than 75 pounds into a sack or tight box and send by express (prepaid) to H. A. Weber, O. S. U., Columbus, Ohio.

5. Mark the sample sent so that it can be identified when it arrives, and send notice of shipment to the writer by mail, giving a description of the field as to its condition and production of crops as far as possible.

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BY ROUMANES, Chicago: The Open Court Pub. Co., 3 Vol., \$4.00.

One of the most difficult problems before scientific writers—that of popularizing scientific thought without at the same time rendering it inaccurate has been accomplished by Professor Roumanes in "Darwin and After Darwin." The work is characterized by the clearness of style and accuracy of statement which marks all this author's writings. The first volume discusses the evidences for organic evolution offered by embryology, and geographical distribution. The author after taking up the facts upon which the theory rests then discusses natural selection, giving the arguments for and against it. This volume is well illustrated and forms a splendid introduc-

tion for the second volume which deals with heredity and the transmission of acquired characters. The subject of heredity especially is carefully treated and is followed by the theoretical discussion of the third volume, which deals with "isolation." This volume, although published after the authors' death and marked by some defects not found in his other writings, is in some ways more interesting than either of the other two. Under isolation the author includes physiological, psychological and geographical and even makes the terms broader than natural selection. The distinctions made in the third volume concerning these terms are surpassed in clearness and logical accuracy by nothing that the author has written. The three volumes taken together make the best introduction to the study of biological problems, and in some ways to natural history that has been published since Darwin's death. They state some difficulties more frankly and clear up some mysteries more thoroughly than is done by any other recent author.

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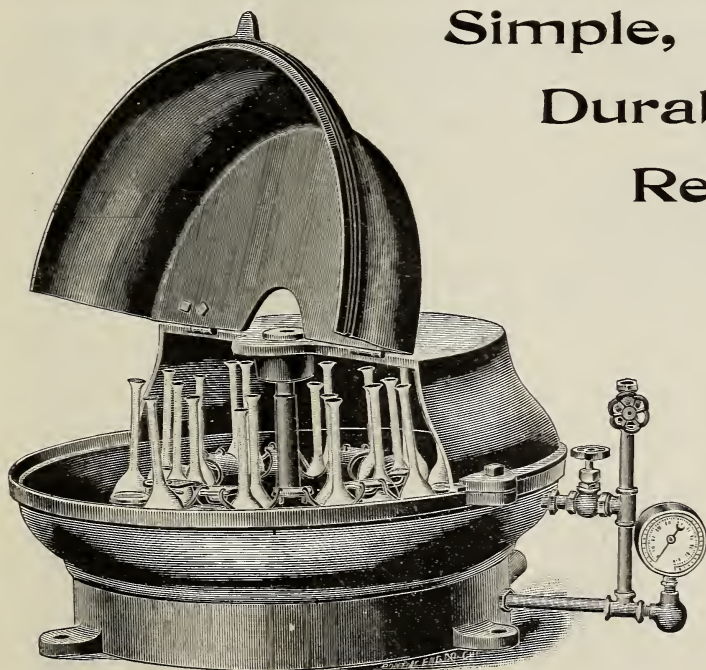
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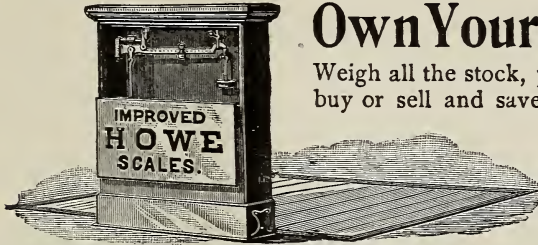
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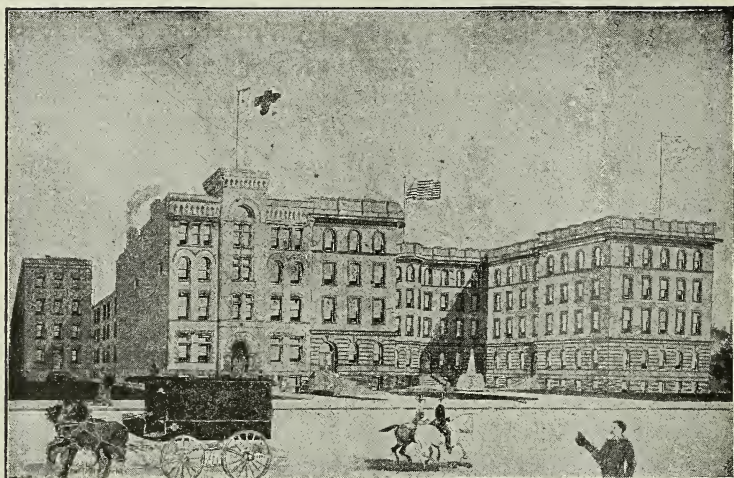
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